Monitoring and assessment of the proportion of oiled Common Guillemots from beached bird surveys in The Netherlands: update winter 2012/13

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Monitoring and assessment of the proportion of oiled Common Guillemots from beached bird surveys in The Netherlands: annual update winter 2012/13

Annual report for the OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic, Meeting the Environment Impacts of Human Activities Committee (EIHA)

Summary

This is the annual update for OSPAR of the beached bird survey (BBS) results in The Netherlands (winter 2012/13). The Dutch BBS provides data for OSPAR area's 8, 9 and 10, but data from Belgian and German colleagues will have to be merged to arrive at the final values for these areas. For the Dutch North Sea region, significant declines in oil rates were reported over a long study period (1977/78-2012/13) as well as over the last 15 years.

Declines were found in offshore seabirds (Common Guillemots (1998-2013; $P< 0.05$), Razorbills ($P< 0.01$) and Black-legged Kittiwakes, $P< 0.01$) as well as in most nearshore species (Common Eider, 1998-2013 $P<0.05$, Herring Gull, $P<0.01$). For coastal Common Scoters, the declining trend was just not significant, partly as a result of small sample size in recent years (1998-2013 $P>0.05$). The arithmetic 5-year running mean for Common Guillemots found along the Dutch North Sea shoreline has currently arrived at *c.* 30-35%. Data tables are provided to calculate running means for OSPAR areas 8, 9, and 10 (after a data merge with additional Belgian and German datasets).

In winter 2012/13, densities of birds washing ashore were rather low and with low densities of stranded birds. In future years, a somewhat higher observer effort is required in order to guarantee a sufficiently large sample of birds to be checked for the presence or absence of oil.

Introduction

Oil pollution of the seas was recognized as a problem in the first half of the 20th century and various countries introduced national regulations to control discharges of oil within their territorial waters (Mörzer Bruijns & Brouwer 1959, Dunnet 1982, 1987). The International Convention for the Prevention of Pollution from Ships and recent amendments meant to reduce the scale and impact of chronic oil pollution worldwide. What is currently known as "MARPOL 73/78" Annex I (oil; following the adoption in 1973, and a modification of the protocol in 1978; IMO 1973/78), entered into force on 2 Oct 1983. With the adoption of a further amendment in 1997, the North Sea and its approaches (the Irish Sea, the Celtic Sea, the English Channel and part of the North East Atlantic immediately to the West of Ireland) were made a Special Area.

The North Sea was considered to be so vulnerable to pollution by oil that oil discharges within them have been completely prohibited. The North Sea Ministers subsequently agreed to monitor spatial and temporal trends in oil pollution on a North Sea scale through their Ecological Quality Objectives (EcoQOs; Bergen Declaration, March 2002, Anon. 2002).

It was proposed that the effectiveness of measures against (chronic) oil pollution, and of any temporal and spatial trends existing and developing in past and current levels of chronic oil pollution could be effectively monitored through beached bird surveys: counts of stranded seabirds on North Sea coasts, coupled with the assessment of oil rates (proportion of birds oiled; Furness & Camphuysen 1997, Camphuysen & Heubeck 2001). Species-specific oil rates were assumed to reflect the risk for various species of marine birds to become oiled at sea. Indeed, high oil rates are characteristic for seabirds that are particularly common in areas with frequent oil spills; lower oil rates were found in birds wintering away from the busiest shipping lanes (Furness & Camphuysen 1997, Camphuysen 2010). Common Guillemots, abundant and widespread seabirds in NW European waters, were particularly useful in this context. By monitoring the occurrence of oil on carcasses of guillemots washing ashore around Europe, spatial and temporal trends in chronic oil pollution could be derived over large geographical scales.

The information need for the monitoring and assessment of oil fouling of seabirds, in particular the Common Guilemot, was first established in the OSPAR organization in the form of an OSPAR Ecological Quality Objective (EcoQO). The Marine Strategy Framework Directive demands in the Commission Decision of 2010, Chapter 8.2, Effects of contaminants, an indicator for oil pollution (EU 2010). In the legal Dutch Kader Richtlijn Marien document, page 78 Vervuilende stoffen (Anon, 2012)., the Oiled Guillemot EcoQO indicator is explicitly implemented. In the EcoQOs for the North Sea, "the Proportion of oiled Common Guillemots among those found dead or dying on beaches" was subsequently listed Under Issue 4 (Seabirds), EcoQO element (f). The "Oiled Guillemot EcoQO", as agreed by the 5th North Sea Conference, was defined as: *"The proportion of such birds should be 10% or less of the total found dead or dying, in all areas of the North Sea"* (Anon. 2002). In spring 2004, ICES WGSE suggested that the "Oiled Guillemot EcoQO" should be reformulated as: The average proportion of oiled Common Guillemots should be 10% or less of the total found dead or dying in each of 15 areas of the North Sea over a period of at least 5 years. Sampling should occur in all winter months (November to April) of each year. This was later refined to target mean proportions of 20% in 2020 and 10% in 2030 over periods of at least 5 years (Anon. 2012).

The present document is the annual update for The Netherlands for winter 2012/13. All data collected since winter 1997/78 have been updated and are incorporated in this report. Oil-rates (% oiled) of Common Guillemots are provided for the Dutch North Sea coast as a whole (monitoring an area of 299 km in length), and for the Dutch contributions to OSPAR areas 8

(238 km), 9 (61 km), and 10 (299 km; see Methods). Raw data are provided in Appendices and an analysis of recent trends is provided in the Results section of this report.

A recent study in The Netherlands showed that, while overall declining trends in oil-rates were found (reflecting a reduction in the amount of oil intentionally discharged over the past 50 years), spatial patterns in the risk to become oiled could be identified when the winter distribution patterns of different bird species were incorporated in the analysis (Camphuysen 2010). Declines in oil rates were more pronounced in coastal birds than in offshore species (such as Common Guillemots), and these trends were consistent with tendencies to police nearshore waters more effectively than offshore waters. Therefore, apart from information on the frequency of oiled Common Guillemots *Uria aalge*, similar data are provided on five other species: two further offshore seabirds (the Black-legged Kittiwake *Rissa tridactyla* and the Razorbill *Alca torda*) and three inshore or more coastal species (Herring Gull *Larus argentatus*, Common Eider *Somateria mollissima*, and Common Scoter *Melanitta nigra*).

Methods

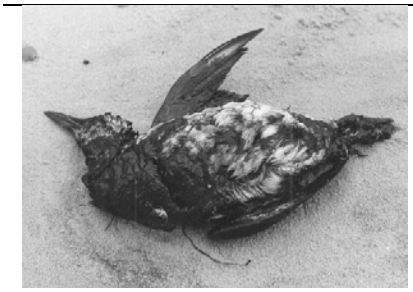
There are several techniques to evaluate spatial and temporal trends in chronic oil pollution. In case of the "Oiled Guillemot EcoQO", however, the significance of chronic oil pollution in particular sea areas is assessed by means of beached bird surveys, in which stranded dead or dying seabirds (notably Common Guillemots) are checked for the presence or absence of mineral oil in their feathers (Camphuysen & Heubeck 2001). Beaches are surveyed by experienced volunteers at regular intervals and with an as wide as possible geographical coverage. Surveys are conducted in winter (Nov-Apr), when the effects of chronic oil pollution are most pronounced and when (illegal) discharges at sea under cover of darkness (*i.e.* at night) are frequent (Vollaard 2013). Stranded seabirds are identified, aged if possible, and the carcass is examined for the presence of oil in the feathers. Other evident causes of death are recorded simultaneously and in case of mass strandings, a special investigation is organized in order to try and explain the event. The "Oiled Guillemot EcoQO" uses ratios (the proportion of birds oiled from the total number of birds found) rather than absolute numbers of birds washing ashore. Yet, oil incidents (identified spills; inflating oil-rates) and food- or weather-related mass mortalities (lowering oil-rates) may influence the outcome of the annual assessments and these aspects have to be both recognized and reported in the annual reports.

In order to evaluate trends in oil rates as described in earlier proposals (Camphuysen 2002, 2004, OSPAR 2004, Camphuysen 2005ab, OSPAR 2005), all incomplete carcasses were excluded from the analysis of beached bird survey results (the presence or absence of oil in the feathers cannot reliably be studied in incomplete remains of birds). The remainder (nTotal) was split in fractions of unoiled (nUnoiled) and oiled (nOiled) individuals. Only substances that were visually classified as mineral oil were considered here. An acceptable oil rate

(nOiled/nTotal*100) is based on at least 25 complete carcasses of stranded seabirds per annum per area (raw data quality code 01, see Appendices) and is otherwise considered 'unreliable' (quality code 00). Annual winter values (% oiled) are provided in bar graphs, with a running (arithmetic) mean calculated over five-year periods (i.e. the mean of five annual values preceding and including a particular value), superimposed with a line graph to illustrate the most recent trends. Lower quality assessments (00, percentages based on less than 25 complete carcasses) are indicated with a lighter shading. To facilitate a trend analysis by means of linear regression, the oil-rates were logit-transformed in order to obtain normalized data distributions, following recommendations in Camphuysen & Van der Meer 1996 (=LOG((x/100)/(1-(x/100))); see also Camphuysen 1995, 1997). For this part of the analysis, lower quality data (quality code 00) were excluded.

The emphasis of this project is on Common Guillemots, but five further seabirds are included to describe recent trends in oil-rates in corroboration of the Guillemot results in this report. All six species are illustrated below:

Selected offshore seabirds



Common Guillemot
Uria aalge

Razorbill
Alca torda

Black-legged Kittiwake
Rissa tridactyla

Selected nearshore or coastal seabirds

Common Eider
Somateria mollissima

Common Scoter
Melanitta nigra

Herring Gull
Larus argentatus

The offshore seabirds include two mostly swimming, deep-diving species (the auks) and one more aerial seabird (kittiwake). The exposure of all three species is relatively high, because they

do not seek shelter or roost on land, even under adverse ambient conditions. The three nearshore or coastal species occur relatively close inshore and again, two mostly swimming and diving species are included (the ducks) plus a more aerial species (a gull). Healthy Common Eiders and Common Scoters will avoid inland waters and will not roost on land, but Herring Gulls occur at sea only to forage and have a considerably lower exposure to marine pollution affecting surface waters than for example Black-legged Kittiwakes. The Oil Vulnerability indices (OVIs) reflect such differences and OVIs for each of these species were high (OVI 45-59) to very high (60-86), following an evaluation by Camphuysen (1989)

Common Guillemot	OVI 82
Razorbill	OVI 86
Black-legged Kittiwake	OVI 66
Common Eider	OVI 75
Common Scoter	OVI 66
Herring Gull	OVI 47

Hence, chronic oil pollution would affect all these species in areas where they occur in numbers, but some species are clearly more susceptible than others.

The Dutch beached bird surveys contribute to three OSPAR areas, but additional data are required from neighboring countries in each case:

OSPAR 8 → Eastern Southern Bight mainland coast Belgian/French border to Texel (B, NL)

OSPAR 9 →Southern German Bight North Sea coast Frisian Islands Texel to Elbe (NL, FRG)

OSPAR 10 → Western Wadden Sea mainland and Wadden Sea coast Frisian Islands Texel to Elbe (NL, FRG)

The NZG/NSO beached bird survey monitoring of these areas consists of 93 discrete sections of coast over 598 km (OSPAR area 8, 38 sections, 238km; area 9, 11 sections, 61km; and area 10, 44 sections, 299 km). Half that area consists of coastline bordering the North Sea, the other half borders the western Wadden Sea (*i.e.* more sheltered waters with particularly intense controls of the occurrence of marine pollution). A "national value" of oil rates is provided by lumping all censuses conducted along the North Sea coast (*i.e.* a combination of the Dutch contributions to OSPAR areas 8 and 9).

Observer effort

Since winter 1977/1978, beached bird surveys have been organized by the Dutch Seabird group. Effort peaked in the 1980s, as a result of the enormous numbers of oiled seabirds washing ashore. Over the last 10 years, (arithmetic) mean (± SD) observer effort amounted to 897 ± 309

km per winter. Effort in 2012/13 was relatively low, as a result of very low numbers of birds washing ashore (**Appendix 1**). It is difficult to activate volunteers for beached bird surveys if the rewards (finds) are low.

For Common Guillemots, however, the obtained data were sufficient to calculate reliable oil rates. A falling interest in beached birds surveys had been noted earlier, but the exceptionally high strandings in the previous season (2011/12) triggered extra activities on Dutch beaches. A further decline in observer effort must be avoided, however. An attempt to recruit new volunteers would possibly help.

Results

Birds found dead – Overall densities in winter 2012/13 were among the lowest on record, whereas densities of stranded birds in the previous season were comparatively high (**Fig. 1**). The absence of prolonged and severe storms and the relatively mild climate may have been responsible for these results.

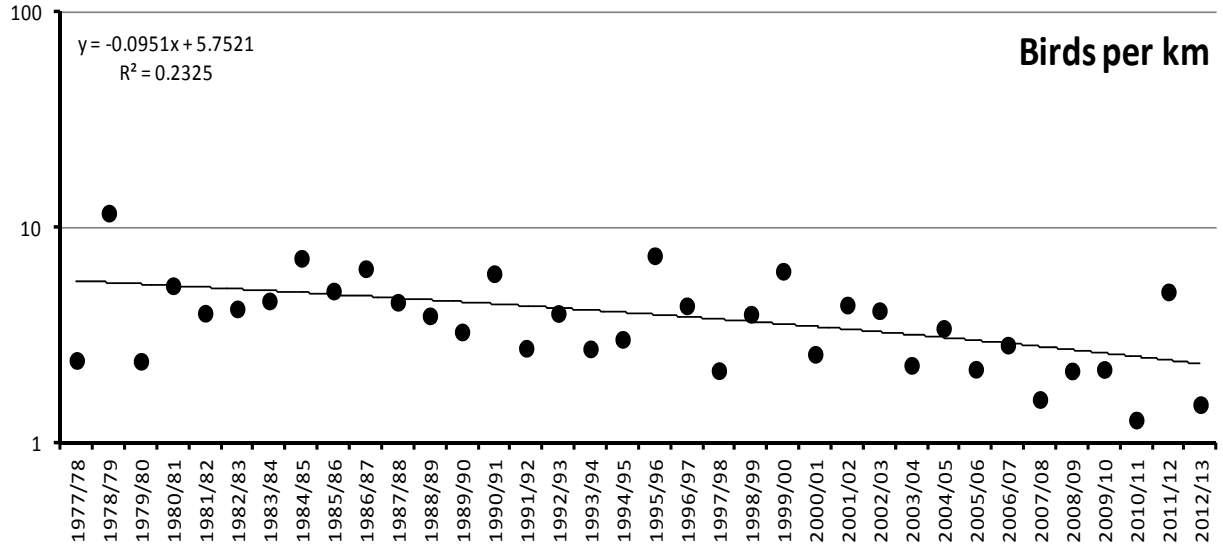


Fig. 1. *Long-term trends in densities of birds (n per km of beach surveyed on a 10log scale; all species combined in all surveyed subregions) washing ashore in The Netherlands ranged from a maximum of 11.7 birds km^{-1} in the severe of winter 1978/79 to a minimum of 1.28 birds km^{-1} in the mild winter 2010/11.*

In all 634 carcasses representing 60 species of birds and five species of mammals were recorded during these most recent censuses (**Appendix 2**). In the top-10, most of the species featuring in the present report are represented:

Top 10 most numerous species	*Scientific name*	Dutch name	Total	Rank
Common Eider	*Somateria mollissima*	Eidereend	152	1
Common Guillemot	*Uria aalge*	Zeekoet	69	2
Black-legged Kittiwake	*Rissa tridactyla*	Drieteenmeeuw	58	3
Herring Gull	*Larus argentatus*	Zilvermeeuw	56	4
Mew Gull	*Larus canus*	Stormmeeuw	36	5
Common Shelduck	*Tadorna tadorna*	Bergeend	20	6
Eurasian Oystercatcher	*Haematopus ostralegus*	Scholekster	19	7
Great Black-backed Gull	*Larus marinus*	Grote Mantelmeeuw	18	8
Razorbill	*Alca torda*	Alk	18	9
Eurasian Woodcock	*Scolopax rusticola*	Houtsnip	15	10

Oil rates in Common Guillemots - The annual oil rate in Common Guillemots along the North Sea coast declined steadily, and significantly since the late 1970s (**Fig. 2**). Along the North Sea coast of The Netherlands as a whole, in line with numerous earlier reports, a significant decline in oil rates could be demonstrated (**Fig. 3**). In winter 2012/13 the national oil rate arrived at an exceptionally low 8% (n= 54). Since winter 2008/9 oil rates of <25% along the North Sea coast have been observed three times (2009/10 19%, n= 47; 2011/12 24%, n= 216 and 2012/13), and the slightly higher oil rate of 2010/11 (39%, n= 18) was unreliable. Including this last value, the five-year running (arithmetic) mean arrived at an all time low of 34.5% (**Appendix 2**). Declining oil rates were found in all three OSPAR regions covered by Dutch surveys (**Figs 4-6**). Numerous carcasses washing ashore along the mainland coast (area 8) are removed by coastal managers and/or by scavenging Red Foxes *Vulpes vulpes* and the sample size obtained is currently too low in most seasons to calculate a reliable oil rate (**Fig. 3**). If combined with the data in neighboring countries, reliable annual values could be provided. As expected for an offshore species, the data are least reliable for the Wadden Sea district itself, where Common Guillemots are rare (**Fig. 4**).

Oil rates in other offshore seabirds - The other offshore seabirds are characterized by very similar trends (**Figs 7-8**), but the numbers washing ashore are more variable as a result of food-related or storm-driven mass-mortalities and associated wrecks. The most recent wrecks occurred in winter 2011/12, resulting in reliable but also spectacularly low oil rates. It is this kind of mortality events that oil rates are artificially lowered and should be treated with caution.

Oil rates in nearshore seabirds - The long-term trends of the coastal species Common Eiders (**Fig. 9**) and Herring Gulls (**Fig. 11**) are remarkable similar. Oiled carcasses are currently rather rare, even along the North Sea coast, indicating an even more pronounced decline in oil rates than in offshore seabirds. Remarkably, the oil rates of the more gregarious Common Scoters (**Fig. 10**) did not decline, until rather recently. The decline coincided with a marked decline in overall numbers washing ashore, and seawatchers confirmed that Common Scoters today are scarce in comparison with the 1970s-90s (Camphuysen & Van Dijk 1983, Platteeuw *et al.* 1994, www.trektellen.nl).

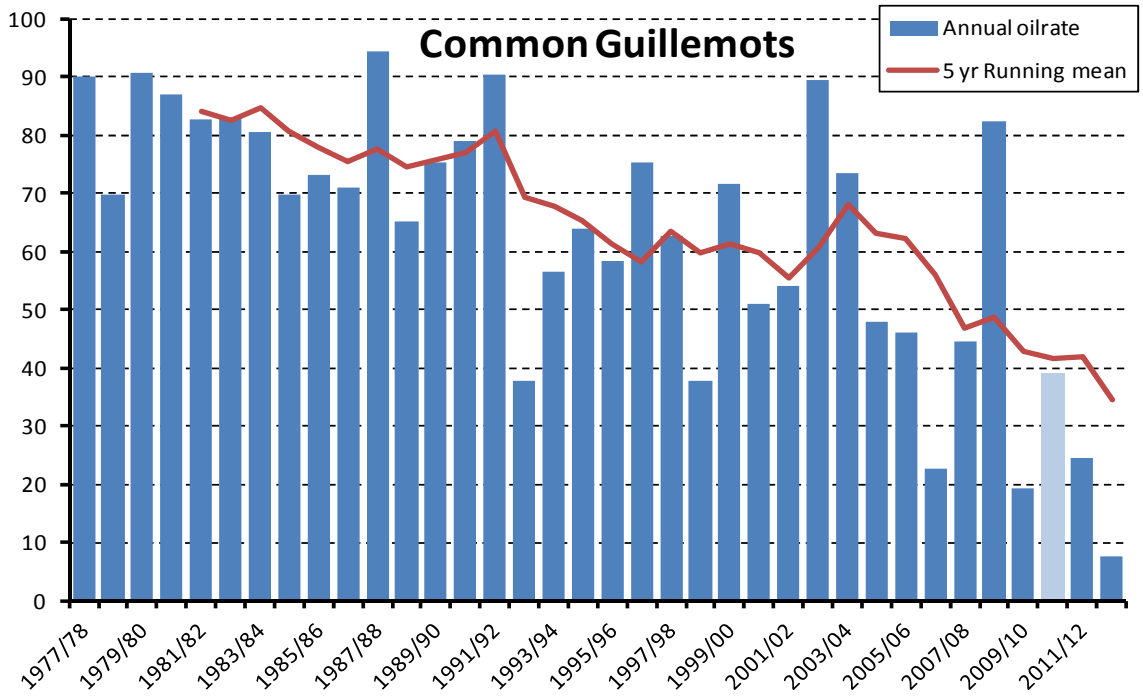


Fig. 2. *Annual oil rates in Common Guillemots (n >25 complete carcasses) in The Netherlands (OSPAR areas 8, 9 and 10) and 5-year running (arithmetic) mean oil rates since the late 1970s. The quality of the assessment over 2010/11 is low due to low sample size. See Fig. 3 for the overall trend in oil rates.*

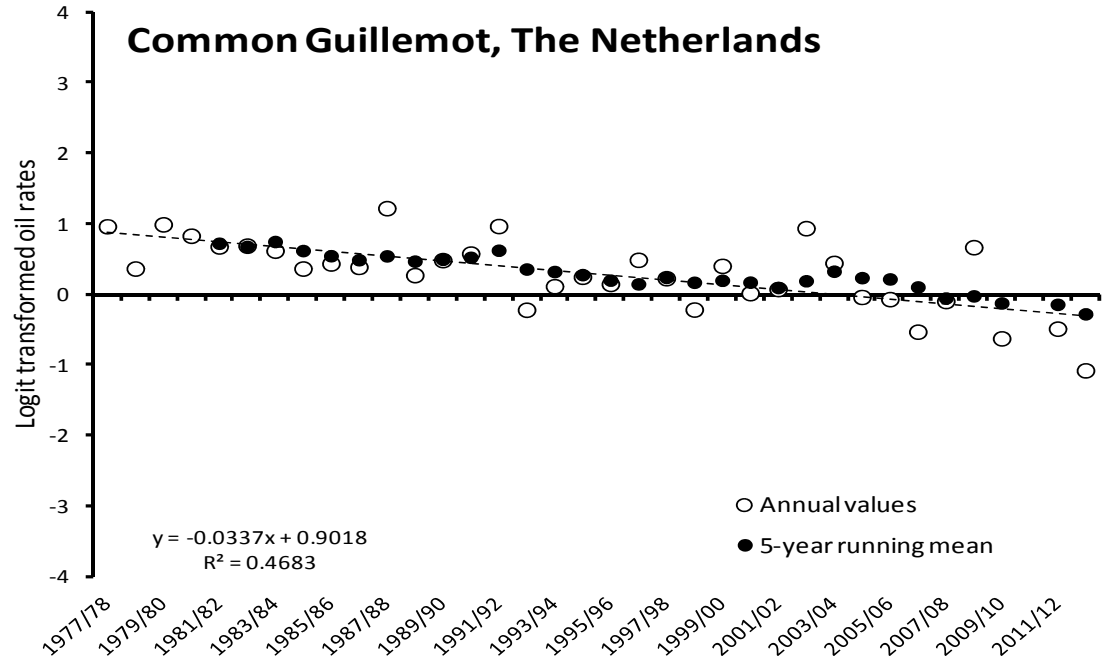


Fig. 3. *Logit-transformed annual oil rates in Common Guillemots (n >25 complete carcasses) in The Netherlands (OSPAR areas 8, 9 and 10) and 5-year running (arithmetic) mean oil rates since the late 1970s. A linear regression was calculated over the annual values since the late 1970s (dashed line; P< 0.001). Linear trend logit-transformed annual values 1997/98-2012/13, P<0.05 (Table 1).*

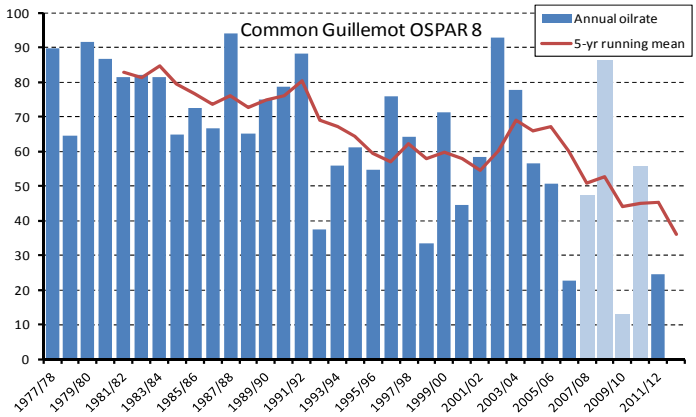


Fig. 4. *Annual oil rates in Common Guillemots (n >25 complete carcasses) in OSPAR area 8 (Dutch contribution only) and 5-year running (arithmetic) mean oil rates since the late 1970s. The quality of the assessments over 2007/08-2010/11 is low due to low sample size.*

Linear trend logit-transformed annual values 1997/98-2012/13, P>0.05 (n.s.; Table 1).

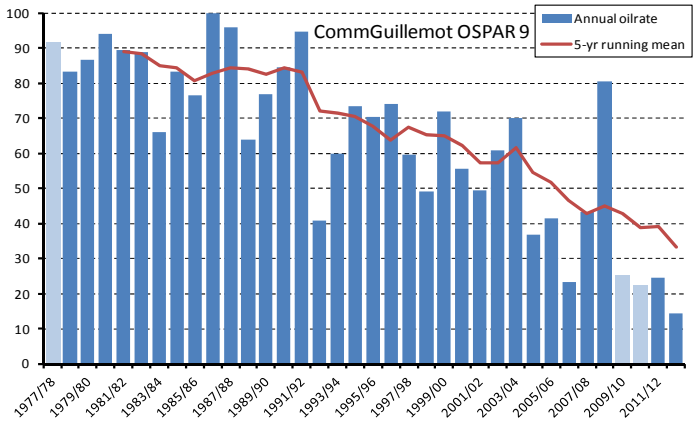


Fig. 5. *Annual oil rates in Common Guillemots (n >25 complete carcasses) in OSPAR area 9 (Dutch contribution only) and 5-year running (arithmetic) mean oil rates since the late 1970s. The quality of the assessment over 2009/10-2010/11 is low due to low sample size.*

Linear trend logit-transformed annual values 1997/98-2012/13, P<0.01 (Table 1).

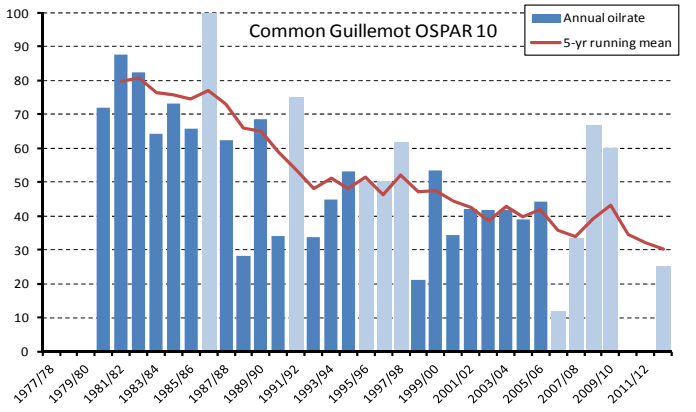


Fig. 6. *Annual oil rates in Common Guillemots (n >25 complete carcasses) in OSPAR area 10 (Dutch contribution only) and 5-year running (arithmetic) mean oil rates since the late 1970s. The quality of the assessments over many years is low due to low sample size.*

Linear trend logit-transformed annual values 1997/98-2012/13, insufficient data; Table 1.

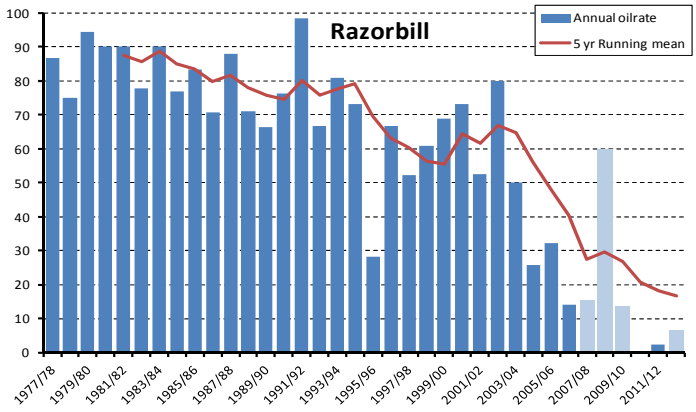


Fig. 7. *Annual oil rates in Razorbills (n >25 complete carcasses) in The Netherlands and 5-year running (arithmetic) mean oil rates since the late 1970s. See Appendix 7 for the quality of values.*

Linear trend logit-transformed annual values 1997/98-2012/13, P<0.01 (Table 1).

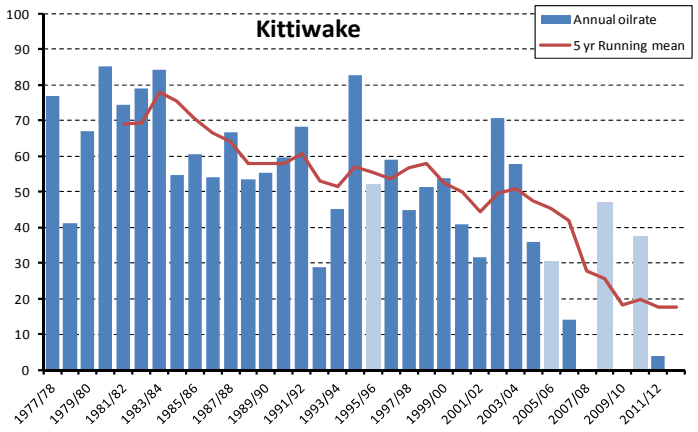


Fig. 8. *Annual oil rates in Black-legged Kittiwakes (n >25 complete carcasses) in The Netherlands and 5-year running (arithmetic) mean oil rates since the late 1970s. See Appendix 8 for the quality of values.*

Linear trend logit-transformed annual values 1997/98-2012/13, P<0.01 (Table 1).

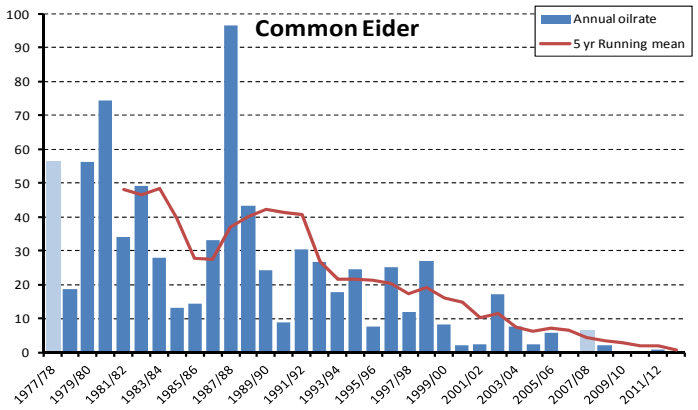


Fig. 9. *Annual oil rates in Common Eiders (n >25 complete carcasses) in The Netherlands and 5-year running (arithmetic) mean oil rates since the late 1970s. See Appendix 9 for the quality of values.*

Linear trend logit-transformed annual values 1997/98-2012/13, P<0.05 (Table 1).

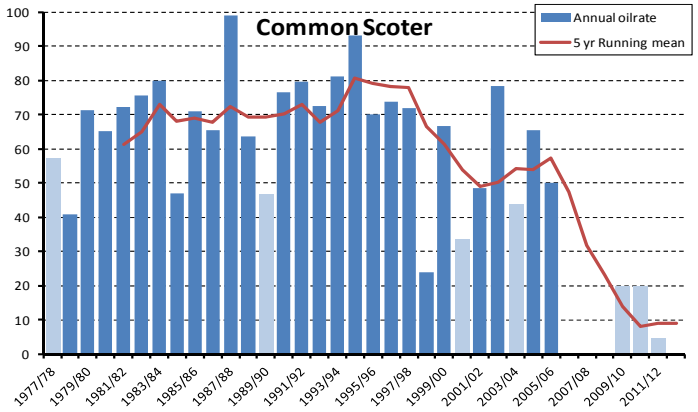


Fig. 10. *Annual oil rates in Common Scoters (n >25 complete carcasses) in The Netherlands and 5-year running (arithmetic) mean oil rates since the late 1970s. See Appendix 10 for the quality of values.*

Linear trend logit-transformed annual values 1997/98-2012/13, P>0.05 (n.s.; Table 1).

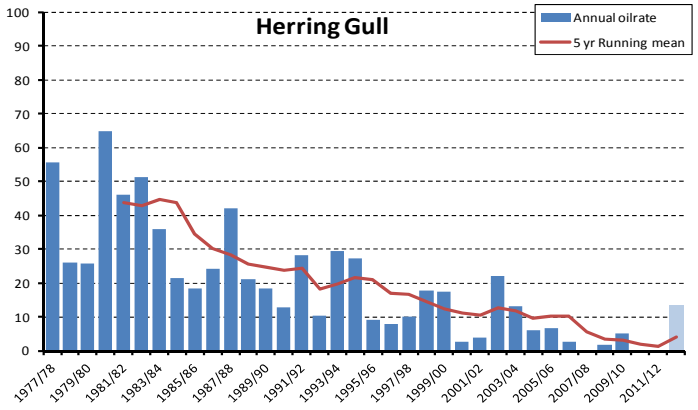


Fig. 11. *Annual oil rates in Herring Gulls (n >25 complete carcasses) in The Netherlands and 5-year running (arithmetic) mean oil rates since the late 1970s. See Appendix 11 for the quality of values.*

Linear trend logit-transformed annual values 1997/98-2012/13, P<0.01 (Table 1).

Recent trends - The long-term trends are evident declines in oil rates in all species, perhaps with the exception of Common Scoters in which the results were more ambiguous. Recent trends in each of these species, calculated over logit-transformed oil rates for the Netherlands North Sea coast as a whole (Dutch contributions to OSPAR 8 and 9 combined), are provided in **Table 1**. Significant results were again all consistent declines in oil rates, while non-significant results in Guillemots along the mainland coast suffered from insufficient data (*Uria* area 8).

Table 1. *Recent trends based on logit transformed oil rates over winters 1997/98 - 2012/13 for Common Guillemots (Uria), Black-legged Kittiwakes (Rissa), Razorbills (Alca), Herring Gulls (Larus), Common Scoters (Melan), and Common Eiders (Somat), for the Dutch North Sea coast as a whole (Nat) and for OSPAR areas 8 and 9 (Dutch contributions only). The significance of the trends is indicated below (P>0.05 is considered non-significant*).

	***Uria* Nat**	***Uria* area 8**	***Uria* area 9**	***Rissa* Nat**	***Alca* Nat**	***Larus* Nat**	***Melan* Nat**	***Somat* Nat**
a=	0.47	0.38	0.34	0.34	0.70	-0.08	0.01	-0.43
b=	-0.07	-0.05	-0.06	-0.09	-0.13	-0.20	0.01	-0.19
r^2=	0.30	0.14	0.39	0.60	0.72	0.54	0.01	0.38
rms	0.22	0.24	0.11	0.10	0.12	0.63	0.14	1.20
se b=	0.03	0.04	0.02	0.03	0.03	0.06	0.05	0.07
t=	-2.24	-1.14	-2.88	-3.68	-4.85	-3.43	0.26	-2.58
n=	14	10	15	11	11	12	9	13
	P<0.05	P>0.05	P<0.01	P<0.01	P<0.01	P<0.01	P>0.05	P<0.05

Discussion and conclusion

In winter 2012/13, rather few seabirds washed ashore and oil rates were generally extremely low (**Fig. 1**). A national value for the Common Guillemot (North Sea coast only, Dutch contrinutions to OSPAR areas 8 and 9 combined) was an all time low, and the 5-year running (arithmetic) mean arrived at *c.* 35% (**Fig. 2**). Oil rates were low in all other birds studied during beached bird surveys and the extremely high numbers of divers (Gaviidae) and scoters (*Melanitta*) wintering off the Dutch coast in winter 2012/13 did not suffer from oil pollution in any noticeable extend.

The relatively cold spring of 2013 and easterly storms led to a seabird wreck along the UK east coast (affecting mainly Atlantic Puffins *Fratercula arctica*). Early in 2013, just as they were returning to the colonies in March, severe weather resulted in the deaths of thousands of birds along the coasts of eastern Scotland and north-east England. Examination of the bodies of some of the 3500 dead puffins found and ringing recoveries suggested that many of the birds involved were breeding adults from local colonies. This period was characterized by prolonged periods of easterly winds within The Netherlands. Many corpses may have drifted away from the Dutch coast and densities within The Netherlands were particularly low in de second half of this winter. The absence of any mass mortalities and wrecks makes the current figures quite reliable estimates of the risk to become contaminated with oil (cf. Camphuysen 1995).

The peak in seabird densities in winter 2011/12 was such that many volunteers set out to search for dead birds in the previous winter season. In 2012/13 the numbers of seabirds were so low, that many of them refrained from searching. There is a need to maintain a somewhat higher observer effort in the coming years to ensure a sufficient sample size (*i.e.* a sufficiently large number of carcasses available for inspection of the presence or absence of oil).

The Dutch data collected for OSPAR regions 8 and 9 must be seen as contributions to the data set. An international co-ordinator, or OSPAR itself, will have to combine Dutch, Belgian and German data for these areas in order to arrive at OSPAR area specific oil rates for Common Guillemots in the southeastern North Sea. There is no doubt that similar trends will be revealed as presented in the current document for the Dutch area as a whole.

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Appendix 1 Observer effort

Kilometer surveyed in beached bird surveys in The Netherlands, winter 1977/78-2012/13. The data for the North Sea include surveys along the North Sea coast (combining Dutch contributions to OSPAR areas 8-9; see Methods). Total effort is the sum for all three contributions (OSPAR areas 8-10).

	North Sea	OSPAR 8	OSPAR 9	OSPAR 10	Total effort (8-10)
1977/78	396.5	356.0	40.5	7.0	403.5
1978/79	527.7	473.2	54.5	3.0	530.7
1979/80	644.3	594.7	49.6	3.0	647.3
1980/81	1647.0	1492.9	154.1	302.0	1949.0
1981/82	1322.1	1176.6	145.5	527.5	1849.6
1982/83	2051.0	1846.0	205.0	748.8	2799.8
1983/84	1606.0	1341.5	264.5	565.6	2171.6
1984/85	1266.8	1133.3	133.5	424.0	1690.8
1985/86	1118.5	1023.0	95.5	470.0	1588.5
1986/87	774.5	708.0	66.5	444.0	1218.5
1987/88	947.2	835.2	112.0	509.4	1456.6
1988/89	1029.4	951.4	78.0	432.7	1462.1
1989/90	1185.3	1062.8	122.5	290.5	1475.8
1990/91	1243.3	1190.8	52.5	123.0	1366.3
1991/92	883.2	806.7	76.5	265.5	1148.7
1992/93	733.3	678.3	55.0	375.5	1108.8
1993/94	588.0	522.5	65.5	482.0	1070.0
1994/95	393.2	335.3	57.9	481.3	874.5
1995/96	568.2	482.2	86.0	328.0	896.2
1996/97	435.8	381.8	54.0	352.5	788.3
1997/98	473.5	377.8	95.7	408.0	881.5
1998/99	1036.2	772.0	264.2	698.5	1734.6
1999/00	988.8	646.7	342.1	904.7	1893.5
2000/01	904.1	450.3	453.8	690.2	1594.3
2001/02	986.6	496.9	489.7	935.5	1922.0
2002/03	1177.6	805.3	372.3	599.6	1777.2
2003/04	678.8	370.0	308.9	516.1	1195.0
2004/05	599.6	284.8	314.8	772.0	1371.6
2005/06	528.9	253.4	275.5	582.6	1111.5
2006/07	569.1	300.7	268.4	515.1	1084.1
2007/08	397.9	231.9	166.0	493.9	891.8
2008/09	470.9	238.9	232.0	361.2	832.1
2009/10	361.6	225.1	136.5	229.8	591.4
2010/11	396.7	276.9	119.8	141.0	537.7
2011/12	538.9	301.6	237.3	405.7	944.6
2012/13	265.7	197.0	68.7	147.3	413.0

Appendix 2 Species found, winter 2011/12

Species	*Scientific name*	Dutch name	Total
Red-throated Diver	*Gavia stellata*	Roodkeelduiker	4
Great Crested Grebe	*Podiceps cristatus*	Fuut	2
Red-necked Grebe	*Podiceps griseigena*	Roodhalsfuut	1
Northern Fulmar	*Fulmarus glacialis*	Noordse Stormvogel	12
Manx Shearwater	*Puffinus puffinus*	Noordse Pijlstormvogel	1
Northern Gannet	*Morus bassanus*	Jan van Gent	13
Great Cormorant	*Phalacrocorax carbo*	Aalscholver	1
European Shag	*Phalacrocorax aristotelis*	Kuifaalscholver	1
Bubulcus ibis	*Bubulcus ibis*	Koereiger	1
Grey Heron	*Ardea cinerea*	Blauwe Reiger	1
Spoonbill	*Platalea leucorodia*	Lepelaar	1
Mute Swan	*Cygnus olor*	Knobbelzwaan	1
Tundra Bean Goose	*Anser serrirostris*	Toendrarietgans	1
Greater White-fronted Goose	*Anser albifrons*	Kolgans	3
Barnacle Goose	*Branta leucopsis*	Brandgans	1
Brent Goose	*Branta bernicla*	Rotgans	6
Common Shelduck	*Tadorna tadorna*	Bergeend	20
Eurasian Wigeon	*Anas penelope*	Smient	3
Gadwall	*Anas strepera*	Krakeend	1
EurasianTeal	*Anas crecca*	Wintertaling	3
Mallard	*Anas platyrhynchos*	Wilde Eend	1
Northern Pintail	*Anas acuta*	Pijlstaart	1
dabbling duck	*Anas spec.*	ongedeterm. zwemeend	1
Common Eider	*Somateria mollissima*	Eidereend	152
Black Scoter	*Melanitta nigra*	Zwarte Zeeëend	12
unidentified duck	*unidentified duck*	ongedeterm. eend	1
Common Buzzard	*Buteo buteo*	Buizerd	1
Gallus domesticus	*Gallus domesticus*	Kip	9
Common Moorhen	*Gallinula chloropus*	Waterhoen	1
Common Coot	*Fulica atra*	Meerkoet	1
Eurasian Oystercatcher	*Haematopus ostralegus*	Scholekster	19
Red Knot	*Calidris canutus*	Kanoetstrandloper	2
Sanderling	*Calidris alba*	Drieteenstrandloper	1
Dunlin	*Calidris alpina*	Bonte Strandloper	3
Eurasian Woodcock	*Scolopax rusticola*	Houtsnip	15
Bar-tailed Godwit	*Limosa lapponica*	Rosse Grutto	1
Eurasian Curlew	*Numenius arquata*	Wulp	9
Common Redshank	*Tringa totanus*	Tureluur	1
Ruddy Turnstone	*Arenaria interpres*	Steenloper	1
Great Skua	*Stercorarius skua*	Grote Jager	1
Black-headed Gull	*Chroicocephalus ridibundus*	Kokmeeuw	14
Mew Gull	*Larus canus*	Stormmeeuw	36
Lesser Black-backed Gull	*Larus fuscus*	Kleine Mantelmeeuw	3
Herring Gull	*Larus argentatus*	Zilvermeeuw	56
Great Black-backed Gull	*Larus marinus*	Grote Mantelmeeuw	18
large gull	*Larus spec.*	ongedeterm. gr. meeuw	1
Black-legged Kittiwake	*Rissa tridactyla*	Drieteenmeeuw	58
Common Guillemot	*Uria aalge*	Zeekoet	69

Species	***Scientific name***	**Dutch name**	**Total**
Razorbill	*Alca torda*	Alk	18
Atlantic Puffin	*Fratercula arctica*	Papegaaiduiker	1
domestic pigeon	*Columba livia*	Postduif	4
Common Wood Pigeon	*Columba palumbus*	Houtduif	1
Short-eared Owl	*Asio flammeus*	Velduil	1
Common Blackbird	*Turdus merula*	Merel	14
Fieldfare	*Turdus pilaris*	Kramsvogel	5
Song Thrush	*Turdus philomelos*	Zanglijster	1
Redwing	*Turdus iliacus*	Koperwiek	3
Black-billed Magpie	*Pica pica*	Ekster	1
Eurasian Jackdaw	*Corvus monedula*	Kauw	1
Common Starling	*Sturnus vulgaris*	Spreeuw	1
Harbour Porpoise	*Phocoena phocoena*	Bruinvis	11
Grey Seal	*Halichoerus grypus*	Grijze Zeehond	1
Common Seal	*Phoca vitulina*	Gewone Zeehond	4
Rabbit	*Oryctolagus cuniculus*	Konijn	1
Brown Hare	*Lepus capensis*	Haas	1

A rare find: freshly dead Red-necked Grebe *Podiceps griseigena,* December 2012 *(JA van Franeker)*

Appendix 3 Common Guillemot *Uria aalge*

Oil rates of Common Guillemots in The Netherlands, winter 1977/78-2012/13. The National survey combines all surveys along the North Sea coast (Dutch contributions to OSPAR 8 and 9).

National			Oil rates			Logit transformed
Winter	nOiled	nTotal	Annual	Qual	5yr mean	Annual oil rates
1977/78	101	112	90.2	01		0.96
1978/79	118	169	69.8	01		0.36
1979/80	137	151	90.7	01		0.99
1980/81	2978	3419	87.1	01		0.83
1981/82	695	841	82.6	01	84.1	0.68
1982/83	2511	3025	83.0	01	82.7	0.69
1983/84	1490	1849	80.6	01	84.8	0.62
1984/85	963	1379	69.8	01	80.6	0.36
1985/86	734	1003	73.2	01	77.8	0.44
1986/87	117	165	70.9	01	75.5	0.39
1987/88	1278	1355	94.3	01	77.8	1.22
1988/89	971	1491	65.1	01	74.7	0.27
1989/90	1105	1468	75.3	01	75.8	0.48
1990/91	1683	2129	79.1	01	76.9	0.58
1991/92	695	770	90.3	01	80.8	0.97
1992/93	358	952	37.6	01	69.5	-0.22
1993/94	407	720	56.5	01	67.7	0.11
1994/95	228	357	63.9	01	65.5	0.25
1995/96	91	156	58.3	01	61.3	0.15
1996/97	160	212	75.5	01	58.4	0.49
1997/98	275	438	62.8	01	63.4	0.23
1998/99	713	1888	37.8	01	59.6	-0.22
1999/00	745	1040	71.6	01	61.2	0.40
2000/01	141	277	50.9	01	59.7	0.02
2001/02	374	690	54.2	01	55.5	0.07
2002/03	2047	2284	89.6	01	60.8	0.94
2003/04	239	325	73.5	01	68.0	0.44
2004/05	247	517	47.8	01	63.2	-0.04
2005/06	81	176	46.0	01	62.2	-0.07
2006/07	135	593	22.8	01	55.9	-0.53
2007/08	28	63	44.4	01	46.9	-0.10
2008/09	65	79	82.3	01	48.7	0.67
2009/10	9	47	19.1	01	42.9	-0.63
2010/11	7	18	38.9	00	41.5	
2011/12	53	216	24.5	01	41.9	-0.49
2012/13	4	52	7.7	01	34.5	-1.08

Appendix 4 Common Guillemot *Uria aalge* – OSPAR area 8

Oil rates of Common Guillemots in The Netherlands, winter 1977/78-2012/13. Surveys along the North Sea coast of the mainland (Dutch contributions to OSPAR 8).

OSPAR 8			Oil rates			Logit transformed
Winter	nOiled	nTotal	Annual	Qual	5yr mean	Annual oil rates
1977/78	79	88	89.8	01		0.94
1978/79	78	121	64.5	01		0.26
1979/80	111	121	91.7	01		1.05
1980/81	2766	3194	86.6	01		0.81
1981/82	586	719	81.5	01	82.8	0.64
1982/83	2184	2657	82.2	01	81.3	0.66
1983/84	1420	1743	81.5	01	84.7	0.64
1984/85	659	1014	65.0	01	79.4	0.27
1985/86	629	866	72.6	01	76.6	0.42
1986/87	96	144	66.7	01	73.6	0.30
1987/88	1131	1202	94.1	01	76.0	1.20
1988/89	893	1369	65.2	01	72.7	0.27
1989/90	1006	1339	75.1	01	74.8	0.48
1990/91	1562	1986	78.7	01	76.0	0.57
1991/92	464	526	88.2	01	80.3	0.87
1992/93	329	881	37.3	01	68.9	-0.22
1993/94	340	608	55.9	01	67.1	0.10
1994/95	170	278	61.2	01	64.3	0.20
1995/96	65	119	54.6	01	59.5	0.08
1996/97	123	162	75.9	01	57.0	0.50
1997/98	198	309	64.1	01	62.3	0.25
1998/99	456	1365	33.4	01	57.8	-0.30
1999/00	531	743	71.5	01	59.9	0.40
2000/01	52	117	44.4	01	57.9	-0.10
2001/02	213	364	58.5	01	54.4	0.15
2002/03	1911	2060	92.8	01	60.1	1.11
2003/04	118	152	77.6	01	69.0	0.54
2004/05	163	288	56.6	01	66.0	0.12
2005/06	44	87	50.6	01	67.2	0.01
2006/07	101	446	22.6	01	60.0	-0.53
2007/08	9	19	47.4	00	51.0	
2008/09	19	22	86.4	00	52.7	
2009/10	3	23	13.0	00	44.0	
2010/11	5	9	55.6	00	45.0	
2011/12	31	126	24.6	01	45.4	-0.49
2012/13		24	0.0	00	35.9	

Appendix 5 Common Guillemot *Uria aalge* – OSPAR area 9

Oil rates of Common Guillemots in The Netherlands, winter 1977/78-2012/13. Surveys along the North Sea coast of the Wadden Sea (Frisian) islands (Dutch contributions to OSPAR 9).

OSPAR 9			Oil rates			Logit transformed
Winter	nOiled	nTotal	Annual	Qual	5yr mean	Annual oil rates
1977/78	22	24	91.7	00		
1978/79	40	48	83.3	01		0.70
1979/80	26	30	86.7	01		0.81
1980/81	212	225	94.2	01		1.21
1981/82	109	122	89.3	01	89.0	0.92
1982/83	327	368	88.9	01	88.5	0.90
1983/84	70	106	66.0	01	85.0	0.29
1984/85	304	365	83.3	01	84.4	0.70
1985/86	105	137	76.6	01	80.8	0.52
1986/87	21	21	100.0	00	83.0	
1987/88	147	153	96.1	01	84.4	1.39
1988/89	78	122	63.9	01	84.0	0.25
1989/90	99	129	76.7	01	82.7	0.52
1990/91	121	143	84.6	01	84.3	0.74
1991/92	231	244	94.7	01	83.2	1.25
1992/93	29	71	40.8	01	72.2	-0.16
1993/94	67	112	59.8	01	71.3	0.17
1994/95	58	79	73.4	01	70.7	0.44
1995/96	26	37	70.3	01	67.8	0.37
1996/97	37	50	74.0	01	63.7	0.45
1997/98	77	129	59.7	01	67.4	0.17
1998/99	257	523	49.1	01	65.3	-0.01
1999/00	214	297	72.1	01	65.0	0.41
2000/01	89	160	55.6	01	62.1	0.10
2001/02	161	326	49.4	01	57.2	-0.01
2002/03	136	224	60.7	01	57.4	0.19
2003/04	121	173	69.9	01	61.5	0.37
2004/05	84	229	36.7	01	54.5	-0.24
2005/06	37	89	41.6	01	51.7	-0.15
2006/07	34	147	23.1	01	46.4	-0.52
2007/08	19	44	43.2	01	42.9	-0.12
2008/09	46	57	80.7	01	45.1	0.62
2009/10	6	24	25.0	00	42.7	
2010/11	2	9	22.2	00	38.8	
2011/12	22	90	24.4	01	39.1	-0.49
2012/13	4	28	14.3	01	33.3	-0.78

Appendix 6 Common Guillemot *Uria aalge* – OSPAR area 10

Oil rates of Common Guillemots in The Netherlands, winter 1977/78-2012/13. Surveys within the Wadden Sea (Dutch contributions to OSPAR 10).

OSPAR 10			Oil rates			Logit transformations
Winter	nOiled	nTotal	Annual	Qual	5yr mean	Annual oil rates
1980/81	214	298	71.8	01		0.41
1981/82	106	121	87.6	01		0.85
1982/83	399	485	82.3	01		0.67
1983/84	127	198	64.1	01		0.25
1984/85	41	56	73.2	01	75.8	0.44
1985/86	129	196	65.8	01	74.6	0.28
1986/87	15	18	83.3	00	73.8	
1987/88	65	104	62.5	01	69.8	0.22
1988/89	66	233	28.3	01	62.6	-0.40
1989/90	61	89	68.5	01	61.7	0.34
1990/91	15	44	34.1	01	55.4	-0.29
1991/92	6	8	75.0	00	53.7	
1992/93	50	148	33.8	01	47.9	-0.29
1993/94	56	125	44.8	01	51.2	-0.09
1994/95	59	111	53.2	01	48.2	0.05
1995/96	4	8	50.0	00	51.3	
1996/97	4	8	50.0	00	46.3	
1997/98	13	21	61.9	00	52.0	
1998/99	99	466	21.2	01	47.3	-0.57
1999/00	90	168	53.6	01	47.3	0.06
2000/01	21	61	34.4	01	44.2	-0.28
2001/02	70	166	42.2	01	42.7	-0.14
2002/03	36	86	41.9	01	38.7	-0.14
2003/04	28	67	41.8	01	42.8	-0.14
2004/05	44	113	38.9	01	39.8	-0.20
2005/06	34	77	44.2	01	41.8	-0.10
2006/07	10	84	11.9	01	35.7	-0.87
2007/08	7	21	33.3	00	34.0	
2008/09	6	9	66.7	00	39.0	
2009/10	6	10	60.0	00	43.2	
2010/11		1	0.0	00	34.4	
2011/12		31	0.0	01	32.0	
2012/13	1	4	25.0	00	30.3	

Appendix 7 Razorbill *Alca torda*

Oil rates of Razorbills in The Netherlands, winter 1977/78-2012/13. The National survey combines all surveys along the North Sea coast (Dutch contributions to OSPAR 8 and 9).

National			Oil rates			Logit transformed
Winter	nOiled	nTotal	Annual	Qual	5yr mean	Annual oil rates
1977/78	33	38	86.8	01		
1978/79	36	48	75.0	01		0.48
1979/80	34	36	94.4	01		1.23
1980/81	526	583	90.2	01		0.97
1981/82	92	102	90.2	01	87.3	0.96
1982/83	1214	1558	77.9	01	85.6	0.55
1983/84	528	586	90.1	01	88.6	0.96
1984/85	89	116	76.7	01	85.0	0.52
1985/86	129	155	83.2	01	83.6	0.70
1986/87	17	24	70.8	00	79.8	0.39
1987/88	198	225	88.0	01	81.8	0.87
1988/89	146	206	70.9	01	77.9	0.39
1989/90	532	802	66.3	01	75.9	0.29
1990/91	163	214	76.2	01	74.4	0.50
1991/92	67	68	98.5	01	80.0	1.83
1992/93	44	66	66.7	01	75.7	0.30
1993/94	51	63	81.0	01	77.7	0.63
1994/95	60	82	73.2	01	79.1	0.44
1995/96	47	166	28.3	01	69.5	-0.40
1996/97	26	39	66.7	01	63.2	0.30
1997/98	58	111	52.3	01	60.3	0.04
1998/99	84	138	60.9	01	56.3	0.19
1999/00	255	371	68.7	01	55.4	0.34
2000/01	19	26	73.1	01	64.3	0.43
2001/02	64	122	52.5	01	61.5	0.04
2002/03	788	987	79.8	01	67.0	0.60
2003/04	55	110	50.0	01	64.8	0.00
2004/05	64	249	25.7	01	56.2	-0.46
2005/06	18	56	32.1	01	48.0	-0.32
2006/07	45	323	13.9	01	40.3	-0.79
2007/08		13	15.4	00	27.4	
2008/09	6	10	60.0	00	29.4	
2009/10	2	15	13.3	00	27.0	
2010/11		5	0.0	00	20.5	
2011/12	9	370	2.4	01	18.2	-1.60
2012/13	1	15	6.7	00	16.5	

Appendix 8 Black-legged Kittiwakes *Rissa tridactyla*

Oil rates of Black-legged Kittiwakes in The Netherlands, winter 1977/78-2012/13. The National survey combines all surveys along the North Sea coast (Dutch contributions to OSPAR 8 and 9).

National			Oil rates			Logit transformed
Winter	nOiled	nTotal	Annual	Qual	5yr mean	Annual oil rates
1977/78	87	113	77.0	01		0.52
1978/79	35	85	41.2	01		-0.15
1979/80	95	142	66.9	01		0.31
1980/81	1317	1545	85.2	01		0.76
1981/82	140	188	74.5	01	69.0	0.46
1982/83	884	1117	79.1	01	69.4	0.58
1983/84	1603	1902	84.3	01	78.0	0.73
1984/85	151	276	54.7	01	75.6	0.08
1985/86	171	282	60.6	01	70.6	0.19
1986/87	61	113	54.0	01	66.6	0.07
1987/88	102	153	66.7	01	64.1	0.30
1988/89	70	131	53.4	01	57.9	0.06
1989/90	87	157	55.4	01	58.0	0.09
1990/91	90	151	59.6	01	57.8	0.17
1991/92	43	63	68.3	01	60.7	0.33
1992/93	66	228	28.9	01	53.1	-0.39
1993/94	28	62	45.2	01	51.5	-0.08
1994/95	43	52	82.7	01	56.9	0.68
1995/96	12	23	52.2	00	55.4	
1996/97	23	39	59.0	01	53.6	0.16
1997/98	62	138	44.9	01	56.8	-0.09
1998/99	97	189	51.3	01	58.0	0.02
1999/00	129	240	53.8	01	52.2	0.07
2000/01	18	44	40.9	01	50.0	-0.16
2001/02	68	216	31.5	01	44.5	-0.34
2002/03	96	136	70.6	01	49.6	0.38
2003/04	37	64	57.8	01	50.9	0.14
2004/05	33	92	35.9	01	47.3	-0.25
2005/06	7	23	30.4	00	45.2	-0.36
2006/07	10	71	14.1	01	41.8	-0.79
2007/08		11	0.0	00	27.6	
2008/09	8	17	47.1	00	25.5	
2009/10	0	14	0.0	00	18.3	
2010/11		8	37.5	00	19.7	
2011/12	10	257	3.9	01	17.7	-1.39
2012/13	0	26	0.0	00	17.7	

Appendix 9 Common Eiders *Somateria mollissima*

Oil rates of Common Eiders in The Netherlands, winter 1977/78-2012/13. The National survey combines all surveys along the North Sea coast (Dutch contributions to OSPAR 8 and 9).

National			Oil rates			Logit transformed
Winter	nOiled	nTotal	Annual	Qual	5yr mean	Annual oil rates
1977/78	13	23	56.5	00		
1978/79	10	54	18.5	01		-0.64
1979/80	18	32	56.3	01		0.11
1980/81	32	43	74.4	01		0.46
1981/82	19	56	33.9	01	47.9	-0.29
1982/83	33	67	49.3	01	46.5	-0.01
1983/84	31	111	27.9	01	48.4	-0.41
1984/85	37	285	13.0	01	39.7	-0.83
1985/86	4	28	14.3	01	27.7	-0.78
1986/87	150	451	33.3	01	27.5	-0.30
1987/88	617	638	96.7	01	37.0	1.47
1988/89	32	74	43.2	01	40.1	-0.12
1989/90	15	62	24.2	01	42.3	-0.50
1990/91	50	568	8.8	01	41.2	-1.02
1991/92	117	384	30.5	01	40.7	-0.36
1992/93	47	177	26.6	01	26.7	-0.44
1993/94	9	51	17.6	01	21.5	-0.67
1994/95	14	57	24.6	01	21.6	-0.49
1995/96	19	252	7.5	01	21.4	-1.09
1996/97	24	95	25.3	01	20.3	-0.47
1997/98	8	68	11.8	01	17.4	-0.88
1998/99	17	63	27.0	01	19.2	-0.43
1999/00	167	2039	8.2	01	15.9	-1.05
2000/01	9	447	2.0	01	14.8	-1.69
2001/02	20	885	2.3	01	10.2	-1.64
2002/03	49	289	17.0	01	11.3	-0.69
2003/04	5	67	7.5	01	7.4	-1.09
2004/05	4	164	2.4	01	6.2	-1.60
2005/06	5	88	5.7	01	7.0	-1.22
2006/07		47	0.0	01	6.5	-∞
2007/08	1	15	6.7	00	4.5	
2008/09	1	53	1.9	01	3.3	-1.72
2009/10		32	0.0	01	2.8	-∞
2010/11	0	16	0	00	1.7	
2011/12	1	125	0.8	01	1.9	-2.09
2012/13	0	8	0	00	0.5	

Appendix 10 Common Scoters *Melanitta nigra*

Oil rates of Common Scoters in The Netherlands, winter 1977/78-2012/13. The National survey combines all surveys along the North Sea coast (Dutch contributions to OSPAR 8 and 9).

National			Oil rates			Logit transformed
Winter	nOiled	nTotal	Annual	Qual	5yr mean	Annual oil rates
1977/78	8	14	57.1	00		0.12
1978/79	144	354	40.7	01		-0.16
1979/80	30	42	71.4	01		0.40
1980/81	28	43	65.1	01		0.27
1981/82	107	148	72.3	01	61.3	0.42
1982/83	114	151	75.5	01	65.0	0.49
1983/84	88	110	80.0	01	72.9	0.60
1984/85	84	179	46.9	01	68.0	-0.05
1985/86	152	214	71.0	01	69.1	0.39
1986/87	99	151	65.6	01	67.8	0.28
1987/88	1557	1573	99.0	01	72.5	1.99
1988/89	51	80	63.8	01	69.3	0.25
1989/90	7	15	46.7	00	69.2	-0.06
1990/91	108	141	76.6	01	70.3	0.51
1991/92	59	74	79.7	01	73.1	0.59
1992/93	63	87	72.4	01	67.8	0.42
1993/94	56	69	81.2	01	71.3	0.63
1994/95	55	59	93.2	01	80.6	1.14
1995/96	96	137	70.1	01	79.3	0.37
1996/97	62	84	73.8	01	78.1	0.45
1997/98	18	25	72.0	01	78.1	0.41
1998/99	41	171	24.0	01	66.6	-0.50
1999/00	42	63	66.7	01	61.3	0.30
2000/01	4	12	33.3	00	54.0	-0.30
2001/02	45	93	48.4	01	48.9	-0.03
2002/03	87	111	78.4	01	50.1	0.56
2003/04	7	16	43.8	00	54.1	-0.11
2004/05	19	29	65.5	01	53.9	0.28
2005/06	9	18	50.0	00	57.2	0.00
2006/07		1	0	00	47.5	
2007/08		1	0	00	31.9	
2008/09		5	0	00	23.1	
2009/10	1	5	20.0	00	14.0	
2010/11	1	5	20.0	00	8.0	
2011/12	1	22	4.5	00	8.9	
2012/13		4	0	00	8.9	

Appendix 11 Herring Gull *Larus argentatus*

Oil rates of Herring Gulls in The Netherlands, winter 1977/78-2012/13. The National survey combines all surveys along the North Sea coast (Dutch contributions to OSPAR 8 and 9).

National			Oil rates			Logit transformed
Winter	nOiled	nTotal	Annual	Qual	5yr mean	Annual oil rates
1977/78	49	88	55.7	01		
1978/79	83	320	25.9	01		-0.46
1979/80	43	168	25.6	01		-0.46
1980/81	278	429	64.8	01		0.27
1981/82	145	315	46.0	01	43.6	-0.07
1982/83	159	310	51.3	01	42.7	0.02
1983/84	203	566	35.9	01	44.7	-0.25
1984/85	77	360	21.4	01	43.9	-0.57
1985/86	46	249	18.5	01	34.6	-0.64
1986/87	46	191	24.1	01	30.2	-0.50
1987/88	56	133	42.1	01	28.4	-0.14
1988/89	45	213	21.1	01	25.4	-0.57
1989/90	51	280	18.2	01	24.8	-0.65
1990/91	26	204	12.7	01	23.7	-0.84
1991/92	33	117	28.2	01	24.5	-0.41
1992/93	13	125	10.4	01	18.1	-0.94
1993/94	32	109	29.4	01	19.8	-0.38
1994/95	24	88	27.3	01	21.6	-0.43
1995/96	10	109	9.2	01	20.9	-1.00
1996/97	8	102	7.8	01	16.8	-1.07
1997/98	11	109	10.1	01	16.7	-0.95
1998/99	25	142	17.6	01	14.4	-0.67
1999/00	24	137	17.5	01	12.4	-0.67
2000/01	3	110	2.7	01	11.2	-1.55
2001/02	5	133	3.8	01	10.3	-1.41
2002/03	24	109	22.0	01	12.7	-0.55
2003/04	7	54	13.0	01	11.8	-0.83
2004/05	4	65	6.2	01	9.5	-1.18
2005/06	2	30	6.7	01	10.3	-1.15
2006/07	1	40	2.5	01	10.1	-1.59
2007/08		21	0.0	00	5.7	
2008/09	1	56	1.8	01	3.4	-1.74
2009/10	1	20	5.0	00	3.2	
2010/11		25	0.0	01	1.9	
2011/12		56	0.0	01	1.4	-∞
2012/13	2	15	13.3	00	4.0	